III.—*Arctic and Antarctic Sponges &c.*

By H. J. Carter, F.R.S. &c.

[Plate I.]

On the 5th of May, 1877, I had the pleasure to receive from Dr. Günther, on behalf of the British Museum, for examination, five small jars containing sponges &c. collected by the naturalists of the last Arctic expedition ; and certainly the contents of these jars, although apparently trifling, are particularly worthy of examination, since it is not the evidence which the four entire specimens of sponges that they contain presents which makes them interesting, but the number of other minute objects about the specimens and the microscopic contents of the sand which has fallen from them to the bottom of the jar. Altogether, too, their comparison with similar results already in the British Museum, which were obtained from the Antarctic regions and Spitzbergen respectively, renders it desirable that they should be specially noticed.

Jars Nos. 1, 2, and 3 are from Capt. H. W. Feilden's collection, and contain as follows :—

No. 1. Specimens of a siliceous sponge (*Semisuberites*, n. sp.) growing upon the outer shell of a large *Balanus*, which itself bears other organisms that will be hereafter mentioned; also two horny sprigs of a Hydrozoon bearing parasitically Foraminifera and Diatomaceæ. The whole, further, labelled "Smith Sound, Cape Napoleon, 50 fths., Aug. 1876."

No. 2. Specimens of a siliceous sponge (*Halichondria panicea*, Johnston), an *Actinia*, and a sprig of a colourless, horny, branched Polyzoon. The whole labelled "Lat. 79. 25, F. Pierce Bay, 15 fths. B. T. 29. 50.—10. 8. 75."

No. 3. Specimen of a calcareous sponge only, viz. *Sycon raphanus*, Sdt. Labelled "Lat. 79. 25, F. Pierce Bay, 15 fths. B. T. 29. 50.—10. 8. 75."

Jars Nos. 4 and 5 contain specimens collected by Mr. Hart.

No. 4. Specimens of calcareous sponges, viz. one each of *Ute glabra*, Sdt., and *Leucosolenia coriacea*, Bk., together with sprigs of branched horny and calcareous Polyzoa respectively. Labelled "Aug. 11th, '75."

No. 5. Three portions of a *Melobesia* (*M. polymorpha*). Labelled "10–20 fths."

On a particular examination of the contents of these jars the following report has been written, beginning with

JAR No. 1.

Sponge, *Semisuberites arctica*, n. sp. (Pl. I. fig. 1, *a–c*.)

General form funnel-shaped, hollow, with a long round stem (fig. 1, *a*), diminishing in size to the point of attachment; mouth subcircular, margin thick, round, undulating (fig. 2, *e*). Colour light grey. Surface reticulate, even. Pores external, microscopic; vents internal, large, plentifully and uniformly scattered over the inner surface of the funnel (fig. 2, *d*). Internal structure loose, light, composed of acuate spicules united together by sarcode into bundles which, crossing each other, produce the usual areolated tissue of sponge. Spicules of one kind only, viz. skeleton, but of two forms, viz.:—1, acuate, slightly curved towards the large end, smooth, and gradually diminishing towards the smaller one, which is rather abruptly pointed; average largest size 1-48th by 1-3000th inch in its greatest diameters (fig. 3, *a*): 2, the same, but with a slight subterminal inflation (fig. 3, *b*). Size of largest specimen (fig. 1) about 3 inches long by $1\frac{3}{4}$ inch across the brim of the funnel.

Hab. Marine, Arctic regions. Growing singly or in plurality on hard objects.

Loc. Smith Sound, Cape Napoleon, in 50 fths.

Obs. There is much interest attaching to this sponge in many ways. First, it is almost identical in elementary structure with *Halichondria sanguinea*, Johnston (Brit. Spong. 1842, p. 133), originally described, with a figure of its spicule, by Dr. Grant in 1826, under the name of *Spongia sanguinea* (Edinb. Phil. Journ. pl. 121. fig. 9), which together with his *Sp. papillaris* are the two commonest sponges on this coast (Budleigh-Salterton, Devon), where they can be found at all tides in great abundance a little below high-water mark. Secondly, Dr. Bowerbank, from the orange-colour and cork-like tissue of *Halichondria sanguinea*, the tendency of its spicules to a pin-like form, and the fact that, in one instance, he found the identical form of flesh-spicule which characterizes *Vioa Johnstonii*, Sdt., and (as I hope soon to show) several other sponges of this kind (Brit. Spong. vol. i. pl. iii. fig. 72, p. 239), points out that both *Semisuberites arctica* and *Halichondria sanguinea* belong to the family Suberitida, of which I also hope soon to give a full account with all hitherto described species in its different groups. Thirdly, a similar specimen of the same sponge, but much larger, from Spitzbergen (fig. 2), was presented to the British Museum by the Rev. A. E. Eaton in 1873, which may easily be found by the register number

73. 10. 35. 1, and its unmistakable whale-ship odour. It is $6\frac{1}{2}$ inches long and $3\frac{1}{4}$ inches across the long diameter of the mouth, whose sides appear to have been partly brought into contact by compression, although the brim is cleft. Fourthly, one of the sponges dredged up by Sir James Ross at $74\frac{1}{2}°$ south latitude, in 300 fths., is also a Suberite. This, too, is in the British Museum, and will be described in the account of the Suberitida to which I have alluded.

Besides the specimens of *Semisuberites arctica* in this jar, there are two branched sprigs of the Hydrozoon *Eudendrium ramosum* (Hincks, Brit. Hyd. Zoophytes, Atlas, pl. xiii.), each about three inches long; and these, again, are more or less covered with parasitic Foraminifera of the rotaline type (chiefly *Pulvinulina*), a great variety of Diatomaceæ, and here and there an acervular calcareous Polyzoon; while the *Balanus*-shell on which the sponges grew bears the beautiful little nutant horny Polyzoon *Pedicellina gracilis* (fig. 1, *e* and fig. 5) in great plurality on its creeping stoloniferous stem, and here and there the little Infusorium *Lagotia viridis* of Strethill Wright (Edinb. New Phil. Journ. 1858), *Freia ampulla*, Clap. et Lachm., abundant here (Budleigh-Salterton) and on the sedges of the brackish marshes in the island of Bombay—thus, like the little *Protococcus nivalis*, flourishing equally in the arctic regions and in the torrid zone, where I found it in 1849 (see my paper "On the Red Colouring-matter in the Salt-pans of Bombay," Journ. Bomb. Asiat. Soc. vol. iii. pt. 2, p. 32).

Having obtained some of the sea-bottom from the jars in the British Museum holding the sponges dredged up in the Antarctic Sea by Sir James Ross, to which I have alluded, and also mounted it in balsam for microscopical examination, I did the same with the sea-bottom from the jar containing *Semisuberites arctica* from Smith Sound, when I found that the two so far agreed that there was not a Coccolith or a Rhabdolith to be found in either, and that, while the sea-bottom from the antarctic regions contained hardly any *Globigerinæ*, that from Smith Sound contained none at all. In other respects, as regards microscopic organisms, they were much alike, excepting that, whereas in the antarctic sand Radiolaria of the genera *Haliomma* and *Dictyocha* abounded, I only found one *Dictyocha* in the sand from Smith Sound.

Now the sea-bottom accompanying Sir James Ross's specimens came from 300 fths. in $74\frac{1}{2}°$ south latitude, while that from Smith Sound was from 50 fths. in about 79° north latitude—that is, off Cape Napoleon.

From Dr. Wallich's observations in H.M.S. 'Bulldog,' in

1860, we learn that "between Greenland and Labrador, along the belt traversed by the arctic current, and in a southerly direction along the coast of Labrador, it (*Globigerina*) is either absent or occurs only in" very "limited quantity" ('Deep-sea Researches on the Biology of *Globigerina*,' p. 5: Van Voorst, 1876); while the most northern sand in which I have observed Coccoliths came from the Atlantic, between the north of Scotland and the Faroe Islands, where they are very abundant in the deep sea; but then, again, they, as well as Coccospheres, are tolerably plentiful about the sponges that grow on the rocks of this shore (Budleigh-Salterton).

Dr. Wallich (*l. c.*) also states that he found *Globigerinæ* present in sea-bottom from "50 to 3000 fths.;" but while Coccoliths are abundant on the sea-shore here, I have never met with *Globigerinæ*; so that it may be questioned whether *their* chief habitat does extend to such shallow water. Be this as it may, the deep-sea bottom of the Atlantic is almost entirely composed of *Globigerinæ* and *Coccoliths*, where the deciduous ones are often agglomerated into tests for the so-called "Arenaceous Foraminifera" and minute Annelids; but in the sea-bottom of Smith Sound, where there are neither, these tests are as often made up of the minute frustules of Diatomaceæ, like those of some of the freshwater arenaceous *Difflugiæ*. Also in Smith Sound minute *Melosiræ* appear to be preferred, probably from their being most plentiful there; while they are as often found in the stomachs of the Polyzoa, but never a *Coccolith* or a *Globigerina*, so far as my observation has been extended.

Lastly, I should mention that a small *Alcyonium* is attached to the *Balanus*-shell (fig. 1, *f*). It is globular, about $\frac{1}{4}$ inch in diameter, and consists of a botryoidal group of melon-shaped cells (fig. 4) of different sizes, according to their age, below $\frac{1}{22}$ of an inch in diameter, the whole growing from a contracted, corrugated base. The polyps are encased with the usual spicular coat, which is extended into each tentacle, of which there are eight; so that this *Alcyonium* probably belongs to the verruciform species, *Nephthya* of Savigny. Some of the cells had their polyps exserted.

In the mounted sand are also present the remains of many other sponges, viz. the perfected flesh-spicule of *Melonanchora elliptica* (Ann. 1874, vol. xiv. p. 212, pl. xiii. fig. 9), the larger spicule of *Corticium abyssi* (ib. 1873, vol. xii. p. 18, pl. i. figs. 3–5), also large bihamates (*fibulæ*), probably of an *Esperia*, and many other spicules whose forms, although different, do not characterize any sponge in particular.

Jar No. 2.

Contains specimens of *Halichondria panicea*, Johnston (*Spongia papillaris*, Grant), of the coast, but with larger spicules and the histodermal coat peculiar to the deep-sea form ; a small *Actinia*; and a sprig of a branched, colourless, horny Polyzoon.

Jar No. 3.

Contains a single specimen only, viz. a calcareous sponge (*Sycon raphanus*, Sdt.).

Jar No. 4.

Contains one specimen each of the calcareous sponges *Ute glabra*, Sdt., and *Leucosolenia coriacea*, Bk. (*Ascetta coriacea*, Häckel); also sprigs of three kinds of branched Polyzoa, one calcareous.

Jar No. 5.

Contains three fragments of *Melobesia polymorpha* only, which was sessile.

I have mentioned all the other organisms which these jars contain besides the sponges to show that the sea-bottom, both in the arctic and antarctic regions, at least so far as regards the latitudes mentioned, is as pregnant with life as that of any other part of the globe, at the same time that it has its peculiarities.

The specimens have been examined and returned to the British Museum without delay.

EXPLANATION OF PLATE I.

Fig. 1. *Semisuberites arctica*, n. sp., growing on the outer shell of a *Balanus*. Natural size. Smith Sound. Lateral view. *a*, stem; *b*, funnel-shaped head; *c*, margin; *d*, *Balanus*-shell; *e*, *Pedicellina gracilis*; *f*, *Alcyonium*; *g g*, stems of *S. arctica* broken off; *h*, dotted line indicating opposite border of mouth.

Fig. 2. The same, from Spitzbergen. Natural size. Lateral view. *a*, stem; *b*, funnel-shaped head; *c*, pore- or external surface; *d*, vents on internal surface; *e*, rounded margin.

Fig. 3. The same, spicules magnified on the scale of 1-12th to 1-1800th inch. *a*, acuate form; *b*, subpinlike form.

Fig. 4. Single cell of *Alcyonium*, fig. 1, *f*, magnified.

Fig. 5. Head of *Pedicellina gracilis*, magnified, to show the organs of the interior. *a*, stem; *b*, calycle; *c*, oral orifice surrounded by tentacles; *d*, anal orifice; *e*, stomach; *f*, tentacles.